

# Salt caves as simulation of natural environment and significance of halotherapy

Joanna Zajac<sup>1</sup>, Iwona Bojar<sup>2</sup>, Jadwiga Helbin<sup>1</sup>, Emilia Kolarzyk<sup>1</sup>, Alfred Owoc<sup>3</sup>

<sup>1</sup> Department of Hygiene and Dietetics, Jagiellonian University, Medical College, Krakow, Poland

<sup>2</sup> Department for Health Problems of Ageing, Institute of Rural Health in Lublin, Poland Lubuski College of Public Health, Zielona Góra, Poland

<sup>3</sup> Lubuski College of Public Health, Zielona Góra, Poland

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## Abstract

**Introduction.** Human activity usually leads to a deterioration in air quality; therefore, searching for places that simulate an environment without pollution is important. Artificial salt caves play crucial role, as a kind of therapy, known as halotherapy, based on treatment in a controlled air medium that simulates a natural salt cave microclimate.

**Objective.** Evaluation of awareness about the existence of salt caves, basic knowledge about the purpose for their presence among people who bought salt caves sessions, and checking their subjective estimation of salt caves influence on their well-being.

**Material & Methods.** 303 inhabitants (18–51-years-old) of 3 randomly chosen cities of southern Poland were surveyed using a validated author's questionnaire. Both genders were represented in comparable numbers.

**Results.** It was observed that knowledge about the existence of salt-caves is common – 94% of respondents. 96 persons bought at least 3 salt caves sessions. The majority of women, did this for therapeutic reasons (57%), and men for both therapeutic and relaxation reasons (both 39%). Both among women and men, the dysfunctions intended to be cured by sessions included problems with throat, larynx or sinus. Depression as a reason for buying sessions was mentioned only by women. In general, those who attended felt better after sessions in salt caves.

**Conclusion.** Besides the health benefits, people do not have free time for rest and activities in clean air; moreover, stress is inseparable from everyday life, and for that reasons salt caves become places that help to support a proper lifestyle.

## Key words

Halotherapy, salt caves, opinion

## INTRODUCTION

The positive influence of natural salt caves and marine microclimate on people's health became a reason for the idea to recreate that climate in specially-adapted artificial interiors. The beneficial effect of salt was first described by the Polish physician F. Bochkowsky in 1843 [1]. Since then, with much criticism and scepticism, salt-based treatment has been spreading continuously. The kind of therapy based on treatment in a controlled air medium that simulates a natural salt cave microclimate is called halotherapy ('halos' in Greek means salt). In general, halotherapy (HT) uses an aero-dispersed environment saturated with dry sodium chloride aerosol in an accurate concentration. The air, the most important factor, is purified of dust and allergens, is dried, and is kept at a temperature between 18–22 °C. The air that crosses walls made from salt, releases such microelements as: iodine, calcium, magnesium, potassium, sodium, copper, selenium, and bromine. High bacteriological purity (clinical studies have revealed that salt in the air which can be absorbed by airways, has bactericidal, hydrophilic and anti-inflammatory properties), constant and adequate humidity (between 50%–60%), constant temperature and unique décor are characteristic for artificial salt caves [1]. Salt used for the construction of salt caves comes from different

sources: deposits in the Dead Sea, Black Sea, Kłodawa, Bochnia or Pakistan deposits. Salt caves that have therapeutic importance are equipped with a salt generator which produces a dry salt aerosol. It also provides the treatment regime in the salt room according to a specific patient's needs, e.g. various sizes of salt particles and concentration of the salt aerosol. A concentration of 1 mg/m<sup>3</sup> is considered as therapeutic [2]. Sizes of the particles varies from 2–5 µm, that can be assimilated by organism [3, 4]. Salt caves without a salt generator can serve only for rest connected with music therapy and phototherapy. In addition, the concentration of NaCl in such salt rooms is vestigial and the concentration of iodine is below the limit of detection, similarly magnesium and calcium [5].

Though the positive influence of the climate of natural caves was noticed in the past, the first scientific data have been known since 50s of the 20<sup>th</sup> century [6]. The impact of salt caves on people's health is ambiguous. Some works emphasize that this kind of therapy may enhance other medication-free therapies, improve the psychophysiological condition of their clients; other studies report improvement in respiratory efficiency and mucus elimination because salt dissolved in mucus increases osmolality, and more water can cross the mucus barrier, which is why the secretion becomes more diluted and could be easily eliminated [7, 8]. On the other hand, some authors present HT as an unproven and uncertain treatment [9, 10]. There are some reports about adverse effects of HT, such as skin irritation, tickle in a throat or drainage of accumulated mucus [11]. In some cases,

Address for correspondence: Joanna Zajac, Department of Hygiene and Dietetics, Jagiellonian University, Medical College, Kopernika 7, 31-501, Krakow, Poland  
e-mail: joanna.jankowska@interia.eu

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in diseases like hyperthyroidism, pulmonary tuberculosis, epilepsy, severe hypertension, recent heart attack, angina pectoris with frequent seizures, lung cancer, pulmonary mycosis or post-myocardial infarction, salt sessions should be limited or even advised against. Therefore, in such cases, consultation with a doctor is necessary [12].

Finding a place with fresh and clean air becomes more and more difficult. At the same time, health-awareness and knowledge about prophylaxis among people are increasing. Especially, the inhabitants of big cities are trying to find opportunities to improve their physical and psychological conditions.

The presented study has 2 aims:

- 1) evaluation of knowledge about salt caves existence;
- 2) assessment of halotherapy influence on the well-being of people who had taken part in salt caves sessions at least 3 times.

## MATERIAL AND METHOD

The study was conducted between May – August of 2012 in 3 cities in southern Poland: Katowice, Kraków and Rzeszów. Trained interviewers called on randomly chosen households in the above-mentioned cities to provide information about the aims of survey. After agreement by 303 persons (aged 18–51) the validated questionnaire was conducted, survey consisted of 20 questions, ranging from questions about gender, age and smoking habits, to questions about participants' knowledge and opinion about salt caves. For those who participated in salt caves sessions an interviewer made an appointment for conducting a questionnaire that would allow assessment of the purpose of visits to a salt cave, and the influence of the sessions on well-being. The presented study was therefore divided into 3 stages:

- a) All participants, who agreed to participate in the survey (58% of total phone calls), were asked about their general knowledge about the existence of salt caves. ('Do you know what salt caves are?' and 'Do you know the purpose for the construction of salt caves?').
- b) Individuals who answered positively were asked their opinion of salt caves influence on peoples' health. Subsequently, interviewers asked if they had taken part in salt caves sessions during the last year. If the participant had taken part in at least 3 sessions, an appointment was made.
- c) In the last part of interview, the participants were asked about frequency of attendance, reasons of buying a ticket to a salt cave, their main health problems they intended to solve with salt cave sessions, and about their opinion/subjective assessment of the effectiveness of the sessions. The final questions were aimed at checking interviewees' knowledge about equipment that must be present in a salt cave for impact on health, and a question about consultation with doctors.

## RESULTS

- a) 285 individuals out of 303 participants knew about the presence of salt caves in their cities. In both genders and in all age categories the percentage of aware participants reached more than 90%. Among those 285 individuals,

respiratory problems were mentioned as the main purpose for the existence of salt caves (97%). In the second place, relaxation was mentioned (73%) and psychological problems (54%).

- b) The majority, 171 participants (60%), were convinced that halotherapy really can improve health. The rest thought that salt caves influence well-being, but the health effect was uncertain (49%). Only 1% of respondents were convinced about the ineffectiveness of halotherapy. Among them, 96 individuals had taken part in halotherapy sessions at least 5 times (Fig. 1). Among the participants of halotherapy sessions, it was found that 70% were women and 30% were men (Fig. 2).

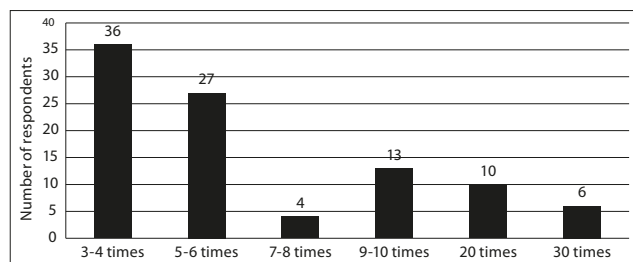


Figure 1. Frequency of attendance at salt caves sessions

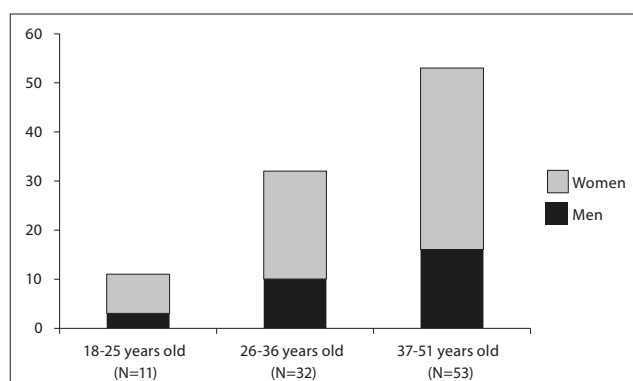


Figure 2. Gender distribution by age

- c) Among those 96 participants, there were 29 men and 67 women aged between 18–51. For the majority of the women, the purpose of the visits in salt caves was therapy. In the case of the men, there were 2 equal reasons: therapeutic and relaxation (Fig. 3). Among people who had bought sessions, subsequent dysfunctions (intended to be cured by salt sessions) were mentioned: mainly (46%) problems with

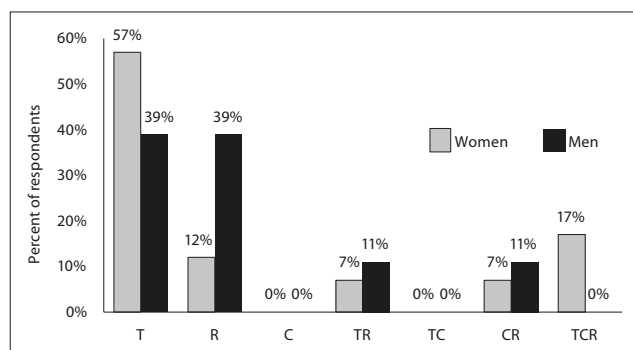
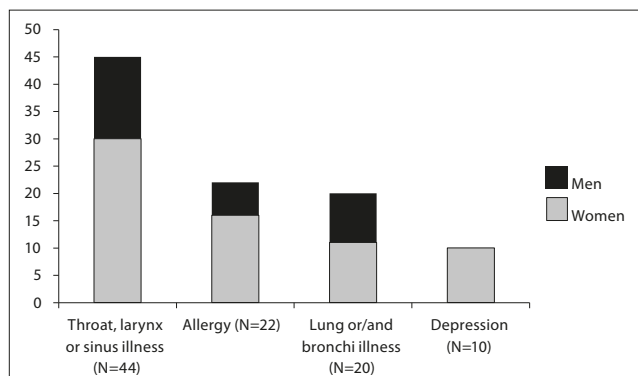


Figure 3. Reasons why people bought sessions in salt caves: T – therapeutic; R – relaxation; C – curiosity; TR – therapeutic and relaxation; TC – therapeutic and curiosity; CR – curiosity and relaxation and TCR – therapeutic and relaxation and curiosity

throat, larynx or sinus and allergy problems were declared by 23% of respondents; 21% complained about lung or/and bronchi illnesses, and depression was a problem for 10% of respondents (Fig. 4). In addition, a few of the respondents



**Figure 4.** Dysfunctions intended to be cured by salt sessions, declared by surveyed individuals

additionally complained about other dysfunctions, e.g. dermatological, thyroid gland dysfunction or digestive system illnesses. 93% of respondents stated that halotherapy, in their subjective opinion, made them feel better and more relaxed. Only 7% found no improvement in their health after sessions. None of them noticed decrease in well-being or any problems after the sessions. It should be mentioned that people who bought salt caves sessions did not have any knowledge about how such salt caves should be equipped to serve curative purposes. None of them had consulted medical care workers prior to their decision to attend salt cave sessions.

## DISCUSSION

Information about salt caves existence is common, irrespective of age, probably because natural methods of treatment are becoming more appreciated; moreover, halotherapy belongs to non-invasive methods. The design and comfortable interiors may induce a lack of objectivity, especially with regard to general well-being [5, 13]. This makes it difficult to draw firm conclusions about their actual therapeutic influence on people's health, although some studies suggest that better well-being, especially in the case of people with respiratory disorders, have scientific basis. Some studies have shown a significant increase in respiratory parameters, e.g. vital capacity (VC), forced vital capacity (FVC), forced expiratory volume in one second (FEV1), peak expiratory flow (PEF) and forced expiratory flow at 50% of FVC (FEF50) after halotherapy treatment. After salt caves treatment, the occurrence of attacks of coughing were less frequent, and less respiratory discomfort experienced, patients slept well and the nervous system was stabilized. Salt cave sessions may alleviate inflammatory processes in the airways, enabling absorption of swellings, thereby re-instating normal mucus flow. In patients with COPD (chronic obstructive pulmonary disease), the majority demonstrated positive symptoms after halotherapy, such as: decrease in cough frequency and intensity, easier expectoration of sputum, which became less viscous. Such clinical symptoms suggest mucociliary transport activation and intensification

of respiratory drainage [7, 14, 15, 16]. Very good results have been obtained in atopic asthma, running at light and moderate courses. Salt therapy noticeably diminished broncho-obstructive syndrome and improved pulmonary ventilation [2, 17, 18]. Many authors stress that improvement was stable for the majority of patients [7, 18, 19]. Furthermore, some studies described positive effects of salt caves for athletes in minimizing tiredness and negative effects of long and intensive exercises [2].

The fashionable trend and insufficient reliable information about halotherapy has resulted in a significant increase in the number of salt caves, but not many of them have modern equipment for controlling the air medium, which can be misleading. The lack of reliable information was raised by questionnaire respondents who expressed doubts about the real influence of salt caves on health.

Salt caves in Poland that have a certificate from the National Institute in Poznań that they are equipped with a salt generator, and therefore can be compared with being by the sea or in a salt mine. Publications about salt caves give information about inhaled concentrations of sodium chloride, iodine, calcium and magnesium in different natural health resorts – Bochnia, Wieliczka, and the area around graduation towers in Ciechocinek, in Konstancin and Inowrocław, and in salt caves with and without salt generator, during a single 45-minutes session. In salt chambers without a salt generator, concentrations of magnesium, calcium or iodine were undetectable, while the concentration of sodium chloride fluctuated between 0.45–1.6 mg/m<sup>3</sup>. In salt rooms with a generator, the level of sodium chloride reach the value of 38 mg/m<sup>3</sup>. For comparison, the average concentration of sodium chloride in natural salt caves varies between 16 mg/m<sup>3</sup> (Bochnia) – 24 mg/m<sup>3</sup> (Wieliczka). It was assessed that during one session the participant absorbs, on average, 13.7 mg of sodium chloride and 1.50 mg of iodine. Equipped salt caves can adjust the concentration and size of particles to patients' needs. The advantages of salt sessions in artificial caves with an aerosol generator can be compared with a stay in natural salt cave: the amount of sodium chloride intake during 45 minutes is higher than in the area around the graduation towers in Ciechocinek during 2 hours, and comparable with one hour in Wieliczka salt mine [20, 21].

In the presented study, the attendance frequency increased with age. The oldest group, represented by people aged between 36–51, more frequently used this kind of natural therapy. Studies in Germany focusing on the popularity of CAM (complementary and alternative medicine) described that CAM was more popular among people aged between 40–49. Additionally, women used such therapy significantly more often than men [21]. Publications of the USA or UK, have described a similar regularity [23, 24]. However, there is an important drawback of the presented study – the lack of age cross-section.

Among respondents in the current study, curiosity did not determine buying a ticket for sessions in artificial caves, probably because the sessions are quite expensive, and more important reasons are needed. Participants, according to the survey, did not buy halotherapy sessions to improve on conventional medicine, and in contrast to German studies, their decisions were not the result of consultations with doctors.

Besides the many advantages of halotherapy mentioned above, its main disadvantage is low impact; therefore it is

necessary to repeat sessions in a salt chamber which leads to higher costs [25]. The effectiveness of salt caves is connected with their construction, which is why it is important to pay attention to the presence of a salt generator. It should also be mentioned that people today have less and less free time for rest and relaxation, and activities in the fresh air; moreover, stress is inseparable from everyday life and for that reasons easy accessible places for rest are necessary.

## CONCLUSION

There is still a lack of reliable information about salt caves. Salt cave sessions buyers, especially those who bought sessions for curative purpose, did not know that salt caves can differ in quality. Nevertheless, in times when the majority of people live under the constant pressure of time, places like salt caves, even those which do not provide curative purposes, can still be helpful for relaxation.

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